REMARKS

This is in response to the Final Office Action mailed April 21, 2005. Claims 1-3, 8-14, 16-27, 29-34 and 36-37 were rejected as being anticipated by U.S. Pat. No. 5,438,517 ("Sennott"), Claims 4, 15, 28 and 35 were rejected as obvious in view of the combination of Sennott and U.S. Pat. No. 6,639,592 ("Dayanand"), and Claims 5-7 were rejected as obvious in view of the combination of Sennott and U.S. Pat. No. 6,253,164 ("Rohm").

Applicants respectfully request reconsideration of the present application in view of the following remarks. Applicants submit that Claims 1-37 are in condition for allowance.

REJECTIONS UNDER 35 U.S.C. § 102

As explained below, Applicants' claims define features not included in the disclosure of the Sennott patent. To facilitate identifying the patentable features of Applicants' claimed subject matter, a brief summary of the Sennott patent is presented, followed by a brief summary of Applicants' disclosed subject matter. Following these summaries, Applicants identify at least one feature in each of Applicants' claims that is not found in or suggested by the disclosure of the Sennott patent.

A. The Sennott patent

The Sennott patent describes a system for operating autonomous vehicles. (See, Sennott: column 1, lines 12-16). According to the Sennott patent, an "autonomous vehicle" is a vehicle which is either completely automatic or substantially automatic without significant human involvement in the operation. (See, Sennott: column 12, lines 8-16). The autonomous vehicles can be used at a mining site, for example. (See, Sennott: column 46, line 62 through column 47, line 31). According to Sennott, the autonomous vehicles are operated within about 20 miles of a base station. (See, Sennott: column 33, lines 19-21.) Part of the system disclosed by Sennott includes a navigator system by which the autonomous vehicles can follow a desired path in the mining site.

B. Summary of Applicants' disclosed subject matter

Applicants' specification discloses an improved method for representing geographic features, such as road geometry. Applicants' disclosed method represents the geographic features using a plurality of control points for a polynomial spline. A polynomial spline consists of piecewise polynomial functions determined completely by a set of control points (and in some cases additional parameters such as knots). The control points are generated by applying a least squares approximation to a plurality of data points. The data points indicate coordinates along the geographic feature. The control points of the polynomial spline define a shape which corresponds to the geometry of the represented geographic feature.

In one embodiment, the data points representing coordinates along the geographic features are provided in a database. Additionally, the control points - generated by fitting the polynomial spline by least squares approximation to the data points - are also stored in a database. Using the control points of the fitted polynomial spline to represent geographic features can reduce the data storage space required to represent curved geographic features compared to a prior method in which the coordinates of actual points located along the lengths of the geographic features are stored while maintaining or enhancing accuracy. In another embodiment disclosed in Applicants' specification, the spline control points are used to display the geographic feature.

C. Differences between Applicants' disclosed subject matter and Sennott

As stated above, Applicants' disclosed subject matter relates to an improved method and system for storing data that represents geographic features. Applicant's disclosed subject matter can be used in the development and use of geographic databases used to model actual road networks. By contrast, Sennott is directed to a system for operating autonomous vehicles which can be used for mining operations. Sennott does not disclose that the control points are generated by applying a least squares approximation.

D. Applicants' independent Claims 1, 14, 16, 23 and 29 distinguish Sennott

As shown below, each of these independent claims includes at least one feature that is neither disclosed in nor suggested by Sennott.

Claim 1

Applicants' independent Claim 1 relates to a method for representing geographic features in a computer-based system. Applicants' independent Claim 1 recites the step of *"fitting a polynomial spline ... by applying a least squares approximation to the data points ... to generate a plurality of control points."* Sennott does not anticipate this claim at least for the reason that Sennott does not disclose generating the control points by applying the least squares approximation to the data points. Although Sennott mentions that polynomial splines may be used to represent autonomous vehicle routes (See, Sennott: column 52, lines 1-2; column 56, lines 5-26), Sennott fails to disclose the Applicants' implementation of applying the *"least squares approximation"* to generate the control points of the polynomial spline. Applying least squares approximation to the data points along the geographic feature is neither inherent in nor obvious in view of the Sennott patent. Applying least squares approximation requires additional processing steps in order to obtain and store the control points of the polynomial spline. Such additional steps are not disclosed by Sennott.

Applicants' respectfully point out that Sennott mentions least squares in contexts not related to polynomial splines; rather, Sennott mentions least squares in the context of the detection of obstacles. (See, Sennott: column 71, lines 15-20, 36-41; column 72, lines 31-40, 47-55). Specifically, Sennott discloses least squares for determining expected values for natural vertical elements of the road including road height, road crown and road bank. The Sennott autonomous vehicle may identify obstacles in the path detected by laser scans and filtered with the expected vertical road values. Sennott's disclosure of least squares for calculating expected values of road height is totally unrelated to and does not suggest the Applicants' least squares approximation to data points to generate control points for the polynomial spline.

Accordingly, for at least these reasons, Sennott does not anticipate Applicants' independent Claim 1.

Claim 14

Applicants' independent Claim 14 relates to a method of displaying a function representing a geographic feature. Applicants' independent Claim 14 recites the spline control points associated with the geographic feature being derived *"using least squares approximation"* from a plurality of data points specifying coordinates of locations along the geographic feature.

As stated above in connection with Applicants' Claim 1, Sennott neither discloses nor suggests deriving the control points by applying the least squares approximation to the data points. Accordingly, because Sennott does not disclose at least this feature of Applicants' Claim 14, Sennott does not anticipate this claim.

There is at least one additional reason why Sennott does not anticipate Applicants' Claim 14. Applicant's Claim 14 also recites the steps of *"displaying the function* (representing the geometry of the geographic feature) *on the computing output device."* Sennott does not disclose displaying the autonomous vehicle route on an output device. In fact, Sennott teaches away from displaying the route because the vehicle is unmanned, there is no need to provide a display of the route for the nonexistent driver. For these additional reasons, Applicants' independent Claim 14 is not anticipated by the Sennott reference.

Claim 16

Applicants' independent Claim 16 relates to a method of generating a computer-usable database. Applicants' independent Claim 16 recites of *"fitting a polynomial spline"* by computing a plurality of control points yielding the *"least squares approximation"* to the data points. As stated above in connection with Applicants' Claim 1, Sennott neither discloses nor suggests computing the control points by yielding the least squares approximation to the data points. Accordingly, because Sennott does not disclose at least this feature of Applicants' Claim 16, Sennott does not anticipate this claim.

Claim 23

Applicants' independent Claim 23 relates to a system for displaying a function representing the geometry of a geographic feature. Applicants' independent Claim 23 recites the spline control points associated with the geographic feature being derived *"using least squares approximation"* from a plurality of data points specifying coordinates of locations along the geographic feature. As stated above in connection with Applicants' Claim 1, Sennott neither discloses nor suggests deriving the control points by applying the least squares approximation to the data points. Accordingly, because Sennott does not disclose at least this feature of Applicants' Claim 23, Sennott does not anticipate this claim.

There is at least one additional reason why Sennott does not anticipate Applicants' Claim 23. Applicant's Claim 23 also recites *"displaying the polyline."* Sennott does not disclose

displaying the autonomous vehicle route on an output device. In fact, Sennott teaches away from displaying the route because the vehicle is unmanned, there is no need to provide a display of the route for the nonexistent driver. For these additional reasons, Applicant's independent Claim 23 is not anticipated by the Sennott reference.

Claim 29

Applicants' independent Claim 29 relates to a system for generating a plurality of spline control points that represent feature geometry. Applicants' independent Claim 29 recites a processor configured to *"apply a least squares approximation"* to the data points to generate the control points for a polynomial spline. As stated above in connection with Applicants' Claim 1, Sennott neither discloses nor suggests generating the control points of the polynomial spline by applying least squares approximation to the data points. Accordingly, because Sennott does not disclose at least this feature of Applicants' Claim 29, Sennott does not anticipate this claim.

E. Applicant's dependent Claims 2-13, 15, 17-22, 24-28 and 30-37

Applicant's dependent Claims 2-13, 15, 17-22, 24-28 and 30-37 depend from base claims that are allowable for the reasons expressed above. Accordingly, each of these dependent claims is also allowable. Moreover, these dependent claims include features or limitations that are neither disclosed nor suggested by Sennott, and therefore, additional reasons support the allowability of these claims.

Conclusion

With the present response, all the issues in the final Office Action mailed April 21, 2005 have been addressed. Applicants submit that the present application has been placed in condition for allowance. If any issues remain, the Examiner is requested to call the undersigned at the telephone number indicated below.

Respectfully submitted,

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